

5        **What is claimed is:**

1.        A video data CODEC system comprising:

macro block data of input video data to produce decimated block data  
representing low frequency part of the macro block data;

10        a first encoder for encoding the decimated block data to produce base

layer DCT data having DCT coefficients representing the low frequency part;

15        a first decoder for decoding the base layer DCT data from the first  
encoder to produce base layer block data;

20        an interpolate unit for performing DCT-based interpolation with respect to  
the base layer block data from the first decoder to produce interpolated base  
layer block data;

25        a second encoder for encoding enhancement layer block data obtained  
from the macro block data and the interpolated base layer block data to produce  
enhancement layer DCT data, the enhancement layer block data representing  
high frequency part of the macro block data; and

30        a second decoder for decoding the enhancement layer DCT data from the  
second encoder to produce reconstructed macro block data.

25        2.        The CODEC system of claim 1, wherein the input video data is  
spatially scalable.

3.        The CODEC system of claim 1, wherein the decimate unit includes:

a first DCT unit for performing DCT with respect to an input block to  
produce a block of DCT coefficients;

30        a truncate unit for selecting a low frequency part of the block of DCT  
coefficients provided from the first DCT unit; and

5        a first IDCT unit for performing IDCT with respect to the low frequency part of the block of DCT coefficients selected by the truncate unit to produce an output block.

10      4.     The CODEC system of claim 3, wherein the output block has a size equal to a quarter of the input block.

15      5.     The CODEC system of claim 3, wherein the decimate unit performs vertical down-sampling with a first matrix and horizontal down-sampling with a second matrix with respect to the input block.

20      6.     The CODEC system of claim 1, wherein the first encoder includes a first motion compensate unit for compensating the decimated block data from the decimate unit with base layer data of a previous picture and motion vectors for the macro block data to produce compensated base layer block data so that the first encoder performs DCT with respect to the compensated base layer block data to produce the base layer DCT data.

25      7.     The CODEC system of claim 6, wherein the first motion compensation unit includes:

30      a first select unit for selecting a block of pixels to be predicted from the base layer data of the previous picture using the motion vectors for the macro block data;

30      an interpolate unit for performing DCT-based interpolation with respect to the block of pixels to be predicted to produce full resolution prediction block data;

5        a second decimate unit for performing DCT-based down-sampling with respect to the full resolution prediction block data to produce base layer prediction block data; and

an adder for subtracting the base layer prediction block data from the decimated block data to obtain the compensated base layer block data.

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8.       The CODEC system of claim 7, wherein the first motion compensation unit further includes a half-pixel interpolate unit for performing an interpolation with half-pixel accuracy with respect to the full resolution prediction block data, output data of the half-pixel interpolate unit being provided to the second decimate unit.

15       9.       The CODEC system of claim 1, wherein the interpolate unit includes:

20       a second DCT unit for converting an input block into a first block of DCT coefficients;

a zero pad unit for padding the first block of DCT coefficients with zeros to produce a second block of DCT coefficients; and

25       a second IDCT unit for performing IDCT with respect to the second block of DCT coefficients to produce an output block.

10.      The CODEC system of claim 9, wherein the input block has a size equal to a quarter of the output block.

30      11.      The CODEC system of claim 9, wherein the interpolate unit performs vertical up-sampling with a third matrix and horizontal up-sampling with a fourth matrix with respect to the input block.

5        12. The CODEC system of claim 1, wherein the second encoder has a  
second motion compensation unit for compensating the enhancement layer  
block data with enhancement layer data of a previous picture and motion  
vectors for the macro block data to produce compensated enhancement layer  
block data so that the second encoder performs DCT with respect to the  
10 compensated enhancement layer block data to produce the enhancement layer  
DCT data.

15        13. The CODEC system of claim 12, wherein the second motion  
compensation unit includes:

16              a second select unit for selecting a block of pixels to be predicted from  
the enhancement layer data of the previous picture using the motion vectors for  
the macro block data;

17              a third DCT unit for performing DCT with respect to the block of pixels to  
be predicted to produce a block of DCT coefficients;

18              a low frequency remove unit for removing low frequency contents of the  
block of DCT coefficients;

19              a third IDCT for performing IDCT with respect to output data of the low  
frequency remove unit to obtain enhancement layer prediction block data; and

20              an adder for subtracting the enhancement layer prediction block data from  
the enhancement layer block data to obtain the compensated enhancement layer  
block data.

25        14. The CODEC system of claim 13, wherein the low frequency remove  
unit removes the low frequency contents by setting low frequency DCT  
30        coefficients to zero.

5        15. A method for performing video data CODEC operations, comprising the steps of:

decimating macro block data of input video data by performing DCT-based down-sampling to obtain decimated block data representing low frequency part of the macro block data;

10      encoding the decimated block data to obtain base layer DCT data having DCT coefficients representing the low frequency part;

decoding the base layer DCT data to obtain base layer block data;

interpolating the base layer block data by performing DCT-based up-sampling with respect to the base layer block data to produce interpolated base layer block data;

subtracting the interpolated base layer block data from the macro block data to obtain enhancement layer block data representing high frequency part of the macro block data;

20      encoding the enhancement layer block data to obtain enhancement layer DCT data; and

decoding the enhancement layer DCT data to obtain reconstructed macro block data.

25      16. The method of claim 15, wherein the input video data is spatially scalable.

17. The method of claim 15, wherein the decimating step includes the steps of:

30      performing DCT with respect to an input block of the macro block data to produce a block of DCT coefficients;

truncating the block of DCT coefficients by selecting a low frequency part of the block of DCT coefficients; and

5 performing IDCT with respect to the low frequency part of the block of  
DCT coefficients to produce the decimated block data.

10 18. The method of claim 15, wherein the encoding the decimated block  
data step includes performing motion compensation of the decimated block  
data, the motion compensation including the steps of:

selecting a block of pixels to be predicted from base layer data of a  
previous picture using motion vectors for the macro block data;

performing DCT-based interpolation with respect to the block of pixels to  
be predicted to produce full resolution prediction block data;

15 decimating the full resolution prediction block data by performing DCT-  
based down-sampling to produce base layer prediction block data; and

subtracting the base layer prediction block data from the decimated block  
data to obtain compensated base layer block data which is subject to DCT to  
produce the base layer DCT data.

20 19. The method of claim 15, wherein the interpolating step includes the  
steps of:

performing DCT with respect to an input block to obtain a first block of  
DCT coefficients;

25 padding the first block of DCT coefficients with zeros to produce a  
second block of DCT coefficients; and

performing IDCT with respect to the second block of DCT coefficients to  
obtain the interpolated base layer block data.

30 20. The method of claim 15, wherein the encoding the enhancement  
layer block data step includes performing motion compensation of the  
enhancement layer block data, the motion compensation includes the steps of:

- 5        selecting a block of pixels to be predicted from enhancement layer data of a previous picture using motion vectors for the macro block data;
- performing DCT with respect to the block of pixels to be predicted to produce a block of DCT coefficients;
- removing low frequency contents of the block of DCT coefficients;
- 10      performing IDCT with respect to the DCT coefficients in which the low frequency contents are removed, to obtain enhancement layer prediction block data; and
- subtracting the enhancement layer prediction block data from the enhancement layer block data to obtain compensated enhancement layer block data which is subject to DCT to produce the enhancement layer DCT data.

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